



DEPARTMENT OF HEALTH & HUMAN SERVICES

RECEIVED

DEC 20 REC'D

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Date December, 5, 1996

From Chief, SPS, SSAB, DHAC


Subject Health Consultation: Pasco Landfill, Pasco, Washington

To Greg Thomas, Senior Representative, Region X

Attached find the health consultation for the Pasco Landfill site prepared by the Washington Department of Health under cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).

As indicated on the certification page contained within the health consultation, ATSDR has reviewed the consultation and concurs with its findings.

If you have any questions or comments, please call me at (404) 639-0628.


Richard E. Gillig

Attachment

cc
Sharon Williams-Fleetwood, ATSDR
Monty Howie, ATSDR
Vicki Skeers, WDOH
Richard Kauffman, ATSDR
Laurie Colombo, DHE
Sean Buckley, DHS

USEPA SF



1426505

Health Consultation

**Pasco Landfill Site
Pasco, Benton County, Washington**

November 5, 1996

**Prepared by
Washington State Department of Health
under cooperative agreement with the
Agency for Toxic Substances and Disease Registry**

Background and Statement of Issues

The Benton-Franklin Health District and Washington Department of Ecology (Ecology) requested an assessment of drinking water data from public and private drinking water supply wells downgradient of the Pasco Landfill Superfund site in Benton County, Washington. Analytical results from sampling events in February and June 1996, indicated volatile organic compound (VOC) contamination at public and private drinking water supply wells. This health consultation represents an evaluation of monitoring results from the two rounds of sampling of public and private drinking water supply wells.

History

The Pasco Landfill Superfund site is about 1.5 miles northeast of the city of Pasco, Washington. The landfill operated as an open burning dump from 1956 until 1971. Municipal wastes were dumped on ground surface and periodically burned. In 1971, the Pasco Landfill was converted to a sanitary landfill. A portion of the landfill was leased in 1972 and operated as a regional hazardous waste disposal site. The site accepted hazardous waste until 1981. Drums of various hazardous waste were deposited in the leased portions of the site. Wastes included sludges, paints, resins, herbicide manufacturing waste, caustic chemicals and empty pesticide containers. Prior to burial, liquid wastes were dried in lined and unlined lagoons.

In 1983 groundwater monitoring began at the landfill to meet state requirements for landfill operations. Additional groundwater studies were conducted leading to the discovery of a release of hazardous substances in the environment. In 1990, the Pasco Landfill was listed on the National Priorities List of hazardous waste sites referred to as Superfund sites. Since 1994, a site remedial investigation has been in progress, and is scheduled to be completed by December 1996.

During the remedial investigation, monitoring wells were installed south of Highway 12 downgradient of the landfill. Results of groundwater samples reported in January 1996 indicated VOC contamination at one of the monitoring wells. This monitoring well is about 1,500 feet upgradient from drinking water wells in east Pasco.

In response, Benton-Franklin Health District and Ecology sampled 11 public/private drinking water supply wells immediately downgradient of the landfill site. Three of 11 wells are public supply wells and 8 are private supply wells. Of the three public supply wells, one well is classified as a Group A system and has 36 connections. Two wells are classified as Group B systems and have 8 and 9 connections. Samples were analyzed for VOCs including the top 10 tentatively identified compounds under the contract laboratory program protocol. VOCs were detected in five wells; three private wells and two public wells (the Group A system and a Group B system).

On June 24, 1996, a second round of sampling occurred at 10 public/private drinking water supply wells. VOCs were again detected in the same five wells. The range of detection for contaminants found in the first and second sampling rounds, and corresponding noncarcinogenic and carcinogenic screening values are presented in Table 1 below.

Free bottled drinking water was made available to affected residents upon request. Working together Benton-Franklin Health District, Ecology and Washington State Department of Health (DOH) informed residents of the sampling results of their wells, and the health significance of findings. On March 26, 1996, an open house was held for the community to address potential health concerns and discuss the remedial investigation being conducted at the Pasco Landfill site. In addition, DOH distributed hand-outs entitled *What are your health concerns?* printed in English and Spanish to encourage residents to share health concerns with DOH either in writing or by calling in health concerns.

Table 1

Chemical	Contaminant Range (µg/L)		Screening Value (µg/L)	
	First Round	Second Round	Noncarcinogenic	Carcinogenic
Carbon Tetrachloride	0.35	ND	7 child RMEG	0.3 CREG
Chloroform	0.31 - 2.4	1.5	100 chronic child EMEG	6 CREG
1,1-Dichlorethane	0.073 - 15.0	2.6 - 9.3	None	None
1,2-Dichlorethane	0.26 - 1.6	1.0	700 CLHA	0.4 CREG
1,1-Dichloroethane	ND	0.04 - 2.3	90 chronic child EMEG	0.06 CREG
cis-1,2-Dichloroethene	2.0 - 33.0	6.0 - 22.0	70 LTHA	None
1,2-dichloropropane	0.13	ND	700 intermediate child EMEG	None
Toluene	0.14 - 0.24	ND	200 intermediate child EMEG	None
Tetrachloroethylene	0.27 - 2.0	1.1	100 child RMEG	0.7 CREG
1,1,1-Trichloroethane	0.12 - 13	ND	200 LTHA	None
Trichloroethylene	0.19 - 16	0.7 - 7.1	20 intermediate child EMEG	3 CREG
Vinyl Chloride	ND	0.04 - 0.12	0.2 chronic child EMEG	None

CLHA Child Longer Term Health Advisory (EPA)
 CREG Cancer Risk Evaluation Guide (ATSDR)
 EMEG Environmental Media Evaluation Guide (ATSDR)
 µg/L micrograms per liter

LTHA Lifetime Health Advisory (EPA)
 ND Not Detected
 RMEG Reference Dose Media Evaluation Guide

Discussion

All five public/private drinking water wells are situated relatively close to each other downgradient of the contaminated monitoring well and the landfill site. To establish a likely and maximum exposure duration for individuals using these contaminated wells, monitoring records maintained by DOH, Division of Drinking Water on public systems were reviewed. This review revealed the Group A system had an earlier detection of VOCs (1,1-dichloroethane at 0.8 $\mu\text{g/L}$, (cis) 1,2-dichloroethene at 1.1 $\mu\text{g/L}$, tetrachloroethylene at 1.7 $\mu\text{g/L}$, and trichloroethylene at 0.9 $\mu\text{g/L}$) in 1992. No other VOC monitoring data has been reported on this system prior to 1992. Therefore, it is not known whether exposure to contaminants in the Group A system occurred before 1992. Currently there are no state requirements for VOC monitoring of Group B systems; therefore, no prior VOC monitoring data is available on the Group B system well. Due to the proximity of the Group B system well, in addition to the three private wells, to the Group A system well and the groundwater flow in the area, these wells may also have been contaminated since 1992. To provide a margin of safety in our evaluation, we will assume that the exposure to contaminated groundwater through the five private/public drinking water wells has occurred since 1992, and possibly longer.

Individuals may be exposed to VOCs through ingestion of contaminated drinking water and through inhalation of vapors during household activities such as cooking, bathing, and washing dishes.

To evaluate the potential for health effects to occur from exposure, contaminant concentrations detected in drinking water samples were compared to ATSDR and EPA health-based screening values. If a concentration exceeds screening value, the estimated daily exposure doses received by adults and children from exposure to that contaminant concentration are then compared to appropriate health-based guidelines for noncarcinogenic and carcinogenic effects.

Since noncarcinogenic screening values were not exceeded by VOC concentrations, exposure to VOCs detected in drinking water are unlikely to result in noncarcinogenic health effects. However, several of VOC contaminants: carbon tetrachloride; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethylene; and trichloroethylene, are detected at concentrations that exceed carcinogenic screening values. Although a carcinogenic screening value is yet to be developed for vinyl chloride, this contaminant is classified by EPA as a human carcinogen.

In further evaluation of these contaminants, EPA has developed drinking water unit risk values for 1,2-dichloroethane, 1,1-dichloroethene, and carbon tetrachloride. Note risk values and exposure assumptions are listed in the Appendix. The unit risk values assess the cancer risk for a population drinking contaminated water continuously over a lifetime. Use of an unit risk value may overestimate cancer risk for people drinking the water for shorter periods of time. To account for inhalation exposure to VOC contaminants, the exposure dose through inhalation is assumed to be equal to the exposure dose through ingestion. Based on

these risk values, there is no increased risk of developing cancer over a lifetime exposure to either 1,2-dichloroethane, 1,1-dichloroethene, and carbon tetrachloride at concentrations found in drinking water samples. Should cancer risk be additive, there is no apparent increase risk of developing cancer over a lifetime from exposure to more than one of these contaminants found in drinking water samples (4).

Vinyl chloride has been classified by EPA as a human carcinogen due to sufficient evidence for carcinogenicity in humans and animals. EPA has estimated a cancer slope factor of $2.3 \text{ (mg/kg/day)}^{-1}$ for oral exposure to vinyl chloride based on the combined incidence of liver and lung tumors in a rat study. The cancer slope factor estimates the lifetime excess cancer risk for an exposed population. It is predicted that individuals exposed to the maximum concentration of vinyl chloride found in drinking water should have no apparent increased risk of developing cancer over a lifetime. Please note that because the cancer slope factor is an upper bound estimate, it is confident that the "actual cancer risk" will not exceed the derived risk estimate and is likely to be less than that predicted (3).

Presently, the lifetime excess cancer risk from exposure to tetrachloroethylene and trichloroethylene in drinking water cannot be evaluated. EPA is currently reviewing both to determine if these chemicals should be classified as probable human carcinogens or as possible human carcinogens. Meanwhile, EPA's oral cancer slope factors for tetrachloroethylene of $0.052 \text{ (mg/kg/day)}^{-1}$ and trichloroethylene of $0.011 \text{ (mg/kg/day)}^{-1}$ have been withdrawn (1, 2).

Should EPA determine that the classification remains as probable human carcinogens for the two chemicals and reinstated the cancer slope factors, it is predicted that residents exposed to maximum concentrations of tetrachloroethylene in drinking water should have no increased risk of developing cancer over a lifetime, and residents exposed to trichloroethylene at maximum concentrations should have no apparent increased risk of developing cancer over a lifetime. Therefore, although both contaminants are under review, a worst case scenario which assumes that both contaminants are probable human carcinogens, shows that exposure for about 70 years would result in negligible excess cancer risk.

Conclusions

Off-site groundwater contamination at the Pasco Landfill site currently poses no apparent public health hazard. While contamination is present, individuals exposed to maximum concentrations of the VOCs found in the drinking water samples are unlikely to experience either noncarcinogenic or carcinogenic health effects.

Because of the unpredictability of contaminants and concentrations which individuals may be exposed to in their drinking water, it is uncertain whether future exposure could reach levels of health concern. For individuals using bottled water, exposure is reduced but not eliminated. Exposure can still occur through inhalation of vapor during activities such as bathing and cooking. While current exposures do not appear to present a concern, due to the

unpredictability of future concentrations, bottled water should be used only as a temporary solution. Residents using bottled water as their drinking water source should understand that the potential for exposure continues through other routes continues.

The nature and extent of the groundwater contamination plume has not been characterized. There is a possibility the groundwater plume will continue to migrate impacting other downgradient private/public supply wells. Further investigations should be conducted to define the direction and velocity of the groundwater plume movement and to identify public/private supply wells that may be impacted.

Because the nature and extent of the groundwater contamination is not completely characterized, continuing VOC monitoring of all public supply wells downgradient of the site should be conducted to ensure residents are not being exposed to VOC concentrations at levels of human health concern. Since continued monitoring of private supply wells is usually not a viable option for most residents to ensure safety of their drinking water, residents should find a long-term alternative drinking water source.

Recommendations

1. DOH will work with the appropriate agencies to ensure that affected residents using bottled water for a drinking water source, are informed of the potential for VOC exposure through the inhalation route.
2. Characterize the nature and extent of groundwater contamination migrating from the Pasco Landfill Superfund site, and identify all private/public drinking water wells which may be impacted by the contamination plume.
3. Monitor for VOCs in public drinking water wells, both Group A and B systems, downgradient of the site to ensure concentrations are not at levels of health concern.
4. DOH will work with the appropriate agency to ensure that owners of private drinking water wells downgradient of the site find a long-term alternative drinking water source.
5. When additional environmental and monitoring data associated with the Pasco Landfill Superfund site, such as the RI, become available, the data should be provided to DOH for evaluation of public health significance.

References

1. *ATSDR Toxicological Profile for Tetrachloroethylene (Update)*, August 1995, U.S. Department of Health & Human Services Public Service Agency for Toxic Substances and Disease Registry.
2. *ATSDR Toxicological Profile for Trichloroethylene (Update)*, August 1995, U.S. Department of Health & Human Services Public Service Agency for Toxic Substances and Disease Registry.
3. *ATSDR Toxicological Profile for Vinyl Chloride (Update)*, August 1995, U.S. Department of Health & Human Services Public Service Agency for Toxic Substances and Disease Registry.
4. Phase I Remedial Investigation Report, Pasco Landfill, Pasco, Washington, Volume I- Technical Report, Burlington Environmental, March 1994
5. Manchester Environmental Laboratory Department of Ecology, Analysis Report, Project Name Pasco Sanitary Landfill, February 5, 1996.
6. Micromedex, Environmental Health & Safety Series, TOMES Plus, expired Oct. 3, 1996 Vol. 30, Integrated Risk Information System (IRIS)
7. Zenon Laboratories Analytical Report, Philip Environmental, Project: 624419 Phase Task 8003.28, July 18, 1996.

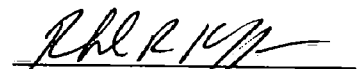
Preparers of the Report

Anne Duffy
Public Health Advisor
Washington State Department of Health

Trace Warner
Public Health Advisor
Washington State Department of Health

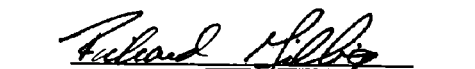
CERTIFICATION

This Pasco Landfill Site Health Consultation was prepared by the Washington Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.


Richard R. Kauffman, M.S.
Technical Project Officer

Superfund Site Assessment Branch (SSAB)
Division of Health Assessment and Consultation (DHAC)
ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.


Richard E. Gilig, M.C.P.
Chief, SPS, SSAB, DHAC, ATSDR

Appendix - Exposure Assumption

Exposure dose through inhalation is assumed to be equal to exposure dose through ingestion.

EPA drinking water unit risk

Carbon Tetrachloride	3.7E-6 per ($\mu\text{g/L}$)
1,1-Dichloroethene	1.7E-5 per ($\mu\text{g/L}$)
1,2-Dichloroethane	2.6E-6 per ($\mu\text{g/L}$)

Lifetime excess cancer risk

Carbon Tetrachloride

$0.35 \mu\text{g/L}$ (maximum concentration) $\times 2$ (account for inhalation) $= 0.70 \mu\text{g/L} \times 3.7\text{E-}6$ per ($\mu\text{g/L}$) $= 2.59\text{E-}6$

ATSDR suggested qualitative interpretation = no increased risk

1,1-Dichloroethene

$2.3 \mu\text{g/L}$ (maximum concentration) $\times 2$ (account for inhalation) $= 4.6 \mu\text{g/L} \times 1.7\text{E-}5$ per ($\mu\text{g/L}$) $= 7.82\text{E-}5$

ATSDR suggested qualitative interpretation = no apparent increased risk

1,2-Dichloroethane

$1.6 \mu\text{g/L}$ (maximum concentration) $\times 2$ (account for inhalation) $= 3.2 \mu\text{g/L} \times 2.6\text{E-}6$ per ($\mu\text{g/L}$) $= 8.32\text{E-}6$

ATSDR suggested qualitative interpretation = no increased risk

Additive cancer risk of carbon tetrachloride, 1,1-dichloroethene, and 1,2-dichloroethane

$2.59\text{E-}6 + 7.82\text{E-}5 + 8.32\text{E-}6 = 8.91\text{E-}5$

ATSDR suggested qualitative interpretation = no increased risk

EPA oral cancer slope factor

Vinyl chloride	$2.3 (\text{mg/kg/day})^{-1}$
Tetrachloroethylene	$0.052 (\text{mg/kg/day})^{-1}$
Trichloroethylene	$0.011 (\text{mg/kg/day})^{-1}$

Standard defaults used

Adult body weight	70 kg
Consumption rate	2 L per day
Exposure duration	70 years
Lifetime	70 years

Appendix - Exposure Assumption

Vinyl chloride

Exposure dose = $0.12 \mu\text{g/L}$ (maximum concentration) $(1\text{E-}3 \text{ mg/ug}) \times 2 \text{ L per day/70 kg} = 3.42\text{E-}6 \text{ mg/kg/day} \times 2$ to account for inhalation = $6.8\text{E-}6 \text{ mg/kg/day}$

Lifetime excess cancer risk

$6.8\text{E-}6 \text{ mg/kg/day} \times 2.3 (\text{mg/kg/day})^{-1} \times (70 \text{ years/70 years}) = 1.56\text{E-}5$

ATSDR suggested qualitative interpretation = no apparent increased risk

Tetrachloroethylene

Exposure dose = $2.0 \mu\text{g/L}$ (maximum concentration) $(1\text{E-}3 \text{ mg/ug}) \times 2 \text{ L per day/70 kg} = 5.7\text{E-}5 \text{ mg/kg/day} \times 2$ to account for inhalation = $1.1\text{E-}4 \text{ mg/kg/day}$

Lifetime excess cancer risk

$1.1\text{E-}4 \text{ mg/kg/day} \times 0.052 (\text{mg/kg/day})^{-1} \times (70 \text{ years/70 years}) = 5.9\text{E-}6$

ATSDR suggested qualitative interpretation = no increased risk

Trichloroethylene

Exposure dose = $16.0 \mu\text{g/L}$ (maximum concentration) $(1\text{E-}3 \text{ mg/ug}) \times 2 \text{ L per day/70 kg} = 4.6\text{E-}4 \text{ mg/kg/day} \times 2$ to account for inhalation = $9.1\text{E-}4 \text{ mg/kg/day}$

Lifetime excess cancer risk

$9.1\text{E-}4 \text{ mg/kg/day} \times 0.011 (\text{mg/kg/day})^{-1} \times (70 \text{ years/70 years}) = 1.0\text{E-}5$

ATSDR suggested qualitative interpretation = no apparent increased risk